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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/702,416	11/06/2003	Daniel C. Edelstein	FIS920030260 US1	8350
29505 7590 06/21/2007 LAW OFFICE OF DELIO & PETERSON, LLC. 121 WHITNEY AVENUE NEW HAVEN, CT 06510			EXAMINER ABOAGYE, MICHAEL	
			ART UNIT 1725	PAPER NUMBER
			MAIL DATE 06/21/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/702,416	Applicant(s) EDELSTEIN ET AL.	
	Examiner Michael Aboagye	Art Unit 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-5 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation "said apparatus" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chittipeddi et al. (US Patent No. 6,472,304) in view of Sakane et al. (JP 56-017048).

Regarding claims 1-5 and 21, Chittipeddi et al. teaches structure formed by bonding an integrated circuit to a substrate comprising: a substrate ("11", figure 1) a gold wire ("61", figure 20) a copper interconnect ("13", figure 1 or "44", figure 21) within said substrate (abstract) and an alloying metal deposited on said metallic interconnect ("74", figure 21), (abstract; column 3, lines 44- 67 and column 4, lines 3-12). The

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intended operating conditions are noted, however, said intended operating conditions do not patentably distinguish said claimed invention over the prior art.

Chittipeddi et al. does not expressly teach forming a low temperature alloy material including Au-Sn or Au-In between the gold wire and the alloy metal.

However, Sakane et al. teaches a semi conductor assembly having, a metallic alloy of Ni-Sn formed on the surface of a substrate; a gold wire bonded by thermocompression to the Ni-Sn layer allowing a low temperature alloy of Au-Sn to be formed between the gold wire and the Sn of the alloy material layer; wherein said alloy prevents migration of species across the interconnect, reduces the risk of joint deterioration and thereby improving the integrity of the bonding process (Sakane et al. abstract). Note the Sn in the Au-Sn eutectic provides the lowering melting point; hence the limitations recited in claim 4 are met.

It would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to deposit Ni -Sn on the copper interconnect of Chittipeddi et al. as taught by Sakane et al. to enable the formation of Au-Sn alloy which prevents migration of species across the interconnect, reduce the risk of joint deterioration and thereby improving the integrity of the bonding process (Sakane et al. abstract).

Response to Arguments

5. The examiner acknowledges the applicants' amendment received by USPTO on March 23, 2007. Claims 1-5 and 21 remain under consideration in the application.

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6. Applicant's arguments filed March 23, 2007 have been fully considered but they are not persuasive. In response to the applicant's argument that it is improper to combine the inventions of Chittipeddi et al. and Sakena et al., It is noted that both references teach thermocompression bonding with a gold wire onto a metallized surface, and depositing a barrier layer which prevents migration of the metallic species forming the metallization. The deficiency of Chittipeddi et al. is drawn to applying a barrier layer, which forms an alloy with the gold wire. Sakena et al. teaches applying a nickel –tin alloy as a barrier layer on the metallized surface with the result that a gold-tin alloy is formed between the gold from the wire and the tin from the alloy deposited which prevents migration of the species forming the metallized surface. The examiner believes that Sakena et al. provides the remedy for the deficiencies of Chittipeddi et al. and that modification of the invention of Chittipeddi et al. in view of the teachings of Sakena et al. meets the applicant's claim invention.

Regarding the applicant's argument that Sakena et al. does not teach bonding an integrated chip to a semiconductor substrate, the examiner's position is that Chittipeddi et al. satisfies these limitations. It is also noted that the features upon which the applicant relies (i.e. an alloying metal deposited on said metallic interconnect or metallized surface said alloying metal comprising alloying metals other than said metallic wire material; and a resultant alloy material formed between said interconnect and said metallic wire) are taught by Sakena et al. Finally, it is noted that the references cannot be considered individually in showing nonobviousness where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Aboagye whose telephone number is 571-272-8165. The examiner can normally be reached on Mon - Fri 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



JONATHAN JOHNSON
PRIMARY EXAMINER

~~AM~~
AM



Michael Aboagye
Assistant Examiner
Art unit 1725

06/14/2007